

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference ITP 40.1	FOR FURTHER ACTION		See item 4 below
International application No. PCT/US2004/028553	International filing date (<i>day/month/year</i>) 02 September 2004 (02.09.2004)	Priority date (<i>day/month/year</i>) 02 September 2003 (02.09.2003)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant INTERNATIONAL TITANIUM POWDER, LLC.			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).
2. This REPORT consists of a total of 12 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report |
| <input checked="" type="checkbox"/> Box No. II | Priority |
| <input checked="" type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> Box No. VI | Certain documents cited |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 740 14 35	Date of issuance of this report 02 March 2006 (02.03.2006)
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PATENT COOPERATION TREATY

REC'D 09 MAR 2005

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From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/028553

International filing date (day/month/year)
02.09.2004

Priority date (day/month/year)
03.09.2003

International Patent Classification (IPC) or both national classification and IPC
C22B9/02, C22B9/04, C22B34/12

Applicant
INTERNATIONAL TITANIUM POWDER, LLC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/028553

Box No. 1 Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/028553

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

4. Additional observations, if necessary:

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/028553

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
- ☒ claims Nos. 33-91

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☒ no international search report has been established for the whole application or for said claims Nos. 33-91
- ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
 - the written form ☐ has not been furnished
 - ☐ does not comply with the standard
 - the computer readable form ☐ has not been furnished
 - ☐ does not comply with the standard
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
- ☐ See separate sheet for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/028553

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☒ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-32

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-32
Inventive step (IS)	Yes: Claims	
	No: Claims	1-32
Industrial applicability (IA)	Yes: Claims	1-32
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/028553

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)
and /or
2. Non-written disclosures (Rules 43*bis*.1 and 70.9)
see form 210

Section II

1. Although the validity of a priority claim is normally not substantively determined during the international phase in the PCT procedure as the priority document is usually not available, the following is noted.
2. Claims 1 to 32 are identical to the claims of PCT application US03/27649, claims 33 to 59 to those of PCT application US03/27653 and claims 60 to 91 to those of PCT application US03/27647. These applications are cited in the description of the present application on page 1.

Each of these three previous PCT applications all claim priorities with dates prior to the priority date of the present application. Consequently, it would appear that the subject matter of present claims 1 to 91 was not disclosed for the first time in the priority document US497192 of 22.08.03 but earlier in the priority documents of the three previous PCT applications. This would lead to the situation that the present application is not entitled to the priority date of 22.08.03 as the filing date for the purpose of Rule 33.1 PCT (Relevant prior art for the International Search) but to the filing date 2.09.04. Additionally, the time span between the priority date of 22.08.03 of one of the three earlier applications and the filing date of 2.09.04 is longer than 12 months. Consequently at least parts of the present application are probably not entitled to the priority dates of 02.09.03 and 03.09.03.

The above-mentioned three PCT applications have all been published before the present filing date of 2.09.04, as indicated in the table below:

Application	US03/27649	US03/27653	US03/27647
Publication nr	WO2004/048622	WO2004/028655	WO2004/022798
Publication date	10.06.04	8.04.04	18.03.04

3. Following from the reasoning in paragraph 2 above, the prior art documents WO2004/048622, WO2004/028655 and WO2004/022798 will be novelty destroying to the subject matter of the claims 1-32, 33-59 and 60-91, respectively, and the requirements of Art.33(2) and (3) PCT will not be fulfilled.

Section IV

1. The application relates to three different inventions..

Claims 1 to 32 relate to a method of separating metal powder from a slurry of liquid metal and metal powder and salt, whereby in a first vessel operated in an inert and/or vacuum atmosphere a separation of liquid metal is performed and the metal powder and salt is then transferred to a second vessel, also operated in an inert atmosphere, before further passivating treatment of the metal powder. The method applies in particular to a slurry obtained by exothermic reaction from introducing a metal halide vapor subsurface of a liquid metal, referred to in the application as the Armstrong method. A corresponding separation system is also claimed.

Claims 33 to 59 relate to a method of separating metal particulates from a slurry of liquid metal, metal particulates and salt particulates. The slurry is filtered to form a cake of metal and salt particulates which contains also some liquid metal. This residual liquid metal is removed after breaking the cake. The method also comprises the step of separating the metal and salt particulates. A related method (claim 51) features the further step of sizing the metal particulates before water washing to prevent unacceptable explosions upon contact with water.

Claims 60 to 91 relate to a transfer mechanism of a slurry from one vessel to another, said transfer mechanism comprising in particular a screw.

2. Each group of claims relates to different problems and feature different solutions, thus justifying the objection of lack of unity under Rule 13 PCT. In particular, the special technical features of the first invention of claims 1 to 32 relate to the use of separate vessels for the separation whereas for the second invention of claims 33 to

59 a filter cake treatment is the main special technical feature. The transfer mechanism of claims 60 to 91 is even more remote from the first two inventions.

The single general concept linking the three families of claims, being a slurry of liquid metal, metal powder and salt, is not new in view of, for example, the documents US-A-5 779 761, US-A-5 985 106 and US-A-6 409 797 cited in the application on page 1 of the description. It does therefore not qualify as a single general inventive concept within the meaning of Rule 13 PCT.

Section V

1. The application relates to a method of separating metal powder from a slurry of liquid metal and metal powder and salt, whereby in a first vessel operated in an inert and/or vacuum atmosphere a separation of liquid metal is performed and the metal powder and salt is then transferred to a second vessel, also operated in an inert atmosphere, before further passivating treatment of the metal powder. The method applies in particular to a slurry obtained by exothermic reaction from introducing a metal halide vapor subsurface of a liquid metal, referred to in the application as the Armstrong method. The separation system is also claimed.
2. Reference is made to the following documents:

D1: US-B-6 409 797

D2: US-A-4 379 718

D1 is cited in the present application and relates to the above-mentioned Armstrong process. The slurry obtained in the reaction chamber 14 is forwarded to a product separator 15 which is said to be a conventional separator such as a cyclone, particulate filter, magnetic separator or vacuum still (col.4, l.24-29), in order to separate the reaction product of titanium and sodium chloride from the sodium stream. The solid cake of salt, Ti and Na is preferably vacuum distilled to remove the Na. Thereafter, the Ti particles are passivated (col.4, l.49-55). The Ti particle size ranges from about 0.1 to 10 μm (col.7, l.43-45).

D2 discloses a process for separating solid particulates from a melt whereby the melt is filtered through a high-temperature filter with a cylindrical rotating filter element (abstract). The filter cake is detached from the filter element by a blade 40 and transferred to a trough 42 before being transferred to a conveyor system 46 which is operating under an inert atmosphere. The conveyor system advantageously includes means for quenching and cooling the filter cake conveyed on the belt 50 (col.6, l.32-46).

3. Method claims

Claims 1 and 14 feature a first and a second vessel for treating the slurry. The product separator 15 of D1 corresponds to the first vessel. As the removal of Na is performed by vacuum distillation, such a step must be performed in a vessel different to that of the solid-liquid separation step, i.e. in a second vessel. The remaining features of the method claims 1 and 14 being also verified by the Armstrong process of D1, the subject matter of these claims does not fulfill the requirement of novelty of Art.33(2) PCT.

The features of the dependent claims 6 to 10 are also directly known from the disclosure of D1.

No inventive step is seen in the features of dependent claims 2, 4, 5, 19 and 20 relating to an Ar inert atmosphere and to the use of a condenser to recover the liquid metal vapor as these features are presented as preferable options in D1. The skilled person would easily consider combining these features with the basic separation process described in D1 in order to optimize the process.

With regard to the crushing of the filter cake of claim 3 and the passivation process on a conveyor of claims 11 and 12, these features are known from D2 which relates to a similar type of separation process as in D1. The combination of the conveyor system of D2 with the passivation step of D1 is therefore seen as obvious to the skilled person.

Consequently, the subject matter of claims 2 to 5, 11, 12, 19 and 20 does not fulfill

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2004/028553

the requirements of Art.33(3) PCT.

4. The protection from contamination by oxygen of claims 13, 21 and 22 and the heating means of claims 15 to 18 and 22 are not disclosed or derivable from the disclosure of D1 or from the combination of D1 with D2.
5. The units on page 8 of the description are not SI units (Rule 10.1 PCT).

Section VI

See section II.